Completed Pollution Prevention Project Case Study

United States Department of Energy
Office of Environmental Management
Fact Sheet

Gamma Ray Detection Crystals Require Less Water

Los Alamos National Laboratory

Original Problem

Crystals of cadmium zinc tellurium (CZT) must be completely smooth for use in devices that detect gamma rays and X-rays. The smooth finish is achieved by polishing the crystal on a cloth-covered disk using progressively finer grits of aluminum oxide. Cleaning the disk between each polishing cycle requires 10-12 gallons of water per crystal, and the cadmium causes the rinse water to become hazardous waste.

The Project Solution

A new method was designed to reuse the water from cleaning the disk. The water used to clean the disk after each polishing cycle is kept in a separate bottle to prevent the different sizes of aluminum oxide grit from mixing. The tiny CZT and aluminum oxide particles settle after a day, and then the water can be siphoned from the top of the bottle for reuse in the washing steps of another crystal. Reusing the water does not have any negative impact on the quality of the polished crystal.

Value of Improvement

Reusing the water reduces the volume of hazardous waste generated by over 1000 gallons per year. The waste will only need to be collected once a year now instead of twice per month. The volume reduction will avoid disposal costs of about $50,000 per year and significantly reduce time spent completing disposal paperwork.

Lifecycle Waste Reduction	
Lifecycle Waste Reduction	>1000gallons /year
Commencement Date	2002
Project Useful Life (Years)	Indefinite

DOE Monetary Benefits	
Total Project Cost	NA
Lifecycle Savings	~$50,000 / year
Return on Investment	NA

Benefits At-A-Glance

- Reduces the amount of hazardous wastewater generated by about 1000 gallons per year.
- Avoids approximately $50,000 in waste disposal expenses annually.
- The site's waste coordinator saves time since completing waste disposal paperwork is necessary much less often.

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Summary Data	
Priority Area:	Waste Minimization Projects
Project Type:	Process Improvement
Total Project Cost:	NA
Lifecycle Savings:	~$50,000 per year in avoided waste disposal costs
Implementing Group:	Space and Atmospheric Sciences
Benefiting Group:	Space and Atmospheric Sciences
Useful Life Years:	Indefinite
Return on Investment:	NA
Lifecycle Waste Reduction:	>1000gallons of hazardous wastewater annually
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Building Upon An Office of Science and Technology Demonstration Success